Mental Health of Transgender and Gender Nonconforming Youth Compared With Their Peers

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abstract

BACKGROUND: Understanding the magnitude of mental health problems, particularly life-threatening ones, experienced by transgender and/or gender nonconforming (TGNC) youth can lead to improved management of these conditions.

METHODS: Electronic medical records were used to identify a cohort of 588 transfeminine and 745 transmasculine children (3–9 years old) and adolescents (10–17 years old) enrolled in integrated health care systems in California and Georgia. Ten male and 10 female referent cisgender enrollees were matched to each TGNC individual on year of birth, race and/or ethnicity, study site, and membership year of the index date (first evidence of gender nonconforming status). Prevalence ratios were calculated by dividing the proportion of TGNC individuals with a specific mental health diagnosis or diagnostic category by the corresponding proportion in each reference group by transfeminine and/or transmasculine status, age group, and time period before the index date.

RESULTS: Common diagnoses for children and adolescents were attention deficit disorders (transfeminine 15%; transmasculine 16%) and depressive disorders (transfeminine 49%; transmasculine 62%), respectively. For all diagnostic categories, prevalence was severalfold higher among TGNC youth than in matched reference groups. Prevalence ratios (95% confidence intervals [CIs]) for history of self-inflicted injury in adolescents 6 months before the index date ranged from 18 (95% CI 4.4–82) to 144 (95% CI 36–1248). The corresponding range for suicidal ideation was 25 (95% CI 14–45) to 54 (95% CI 18–218).

CONCLUSIONS: TGNC youth may present with mental health conditions requiring immediate evaluation and implementation of clinical, social, and educational gender identity support measures.

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Drs Becerra-Culqui and Goodman conceptualized and designed the study, contributed to the acquisition of data, conceptualized the analysis plan, coordinated the interpretation of results (including contributing expertise in epidemiologic methods and childhood developmental and/or psychological outcomes), and drafted and finalized the manuscript; Drs Getahun, Nash, Quinn, Roblin, and Silverberg and Ms Hunkeler conceptualized and designed the study, contributed to the acquisition of data, critically reviewed the manuscript for important intellectual content

WHAT'S KNOWN ON THIS SUBJECT: Small, specialized, clinic-based studies reveal a high prevalence of mental health diagnoses and self-reported emotional and behavioral problems among transgender and/or gender nonconforming youth.

WHAT THIS STUDY ADDS: In this large cohort study of an unselected transgender and/or gender nonconforming group, youth experienced a high relative prevalence of mental health conditions such as anxiety, depression, and attention deficit disorders compared with their cisgender counterparts.

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As gender identity develops, it may not match the gender of rearing or gender assigned at birth, which are typically based on the appearance of external genitalia.[1–3] When gender identity differs from the one assigned at birth, the terms gender diverse or gender nonconforming may apply.[4,5] Although the natural history of gender nonconformity presented in early childhood remains an area of ongoing research, some gender nonconforming children may go on to adopt an identity that is different from their assigned gender (10%–30%, according to reported estimates).[6,7] Researchers in studies of gender development in the general population support that gender-typed behavior is noticeable and stable between 3 and 8 years of age, especially in children with relatively high or low gender-typical behavior.[8,9] Individuals may identify as transgender, a term that refers more narrowly to those whose identity is "opposite" of their assigned gender.[10] Conversely, individuals who identify with the gender assigned to them at birth are sometimes referred to as cisgender.[10]

An important priority for the health of transgender and/or gender nonconforming (TGNC) children and adolescents is the identification and management of mental health conditions.[11–13] These conditions may be related to gender dysphoria, which is defined as a feeling of distress when one's assigned gender does not match their identity.[14] In addition, children with gender nonconforming behavior may experience stress from prejudice and discrimination because of being part of a minority group, which can create or exacerbate emotional and behavioral problems.[15]

The literature on TGNC youth consistently reveals a high prevalence of self-reported emotional and behavioral problems and mental health diagnoses.[16–23] Most of the available data used to address the mental health status of TGNC youth come from specialized clinics providing care to this population.[24] Although researchers in clinic-based studies offer detailed and high-quality data,[25,26] they often lack information on individuals who have not sought or had no access to specialized care. Moreover, a reliance on specialized clinics to identify study participants may yield relatively small sample sizes, making it difficult to select comparable reference groups from the same underlying population.[27]

These issues motivated the researchers in the Study of Transition, Outcomes, and Gender (STRONG), which was designed to assess morbidity among TGNC people overall and in the transfeminine and transmasculine subgroups of different ages, and captured in any care setting. However, this study communication is focused on cohort members who first presented as TGNC before their 18th birthday. Our objectives in this study were to estimate the prevalence of mental health diagnoses among transfeminine and transmasculine children and adolescents at the time of their initial presentation (index date) and compare their mental health status to that of their cisgender counterparts.

METHODS

The STRONG was designed as an electronic medical record (EMR)–based retrospective and prospective cohort study of members at 3 Kaiser Permanente (KP) sites (Georgia, Northern California, and Southern California) in partnership with the coordinating center at the Emory University Rollins School of Public Health. These KP sites provide comprehensive health services to >8.8 million members who are sociodemographically diverse and representative of their respective communities.[28,29] In the clinical setting, the identification of TGNC youth may begin at age 13 years during physical examinations as part of the psychosocial and/or behavioral assessment recommended by the American Academy of Pediatrics[30]; however, some TGNC children may be identified earlier or later in life. All activities were reviewed and approved by the institutional review boards of the 4 participating institutions.

As described previously,[31,32] persons with first evidence of TGNC status between January 1, 2006, and December 31, 2014, were identified on the basis of *International Classification of Diseases, Ninth Edition* (ICD-9) codes and the presence of specific keywords in free-text clinical notes (Supplemental Table 5). TGNC status was then verified (Supplemental Fig 1). A second free-text program was developed with additional anatomy-related or gender-affirmation keywords, which were reviewed and adjudicated for transfeminine or transmasculine status (Supplemental Table 6). Transfeminine and/or transmasculine status was assigned by using demographic information from the EMRs of 220 children whose gender assignment could not be determined from text strings because a validation revealed that the demographic variable accurately reflected assigned gender in 96% of youth. Subjects with evidence of disorders of sex development (eg, variation of chromosomal, gonadal, and/or anatomic sex development) were excluded because they may have distinct medical histories and gender identity trajectories.[33]

Ten male and 10 female cisgender KP enrollees were matched to each member of the final validated TGNC cohort on the basis of year of birth, race and/or ethnicity, site, and membership year of the index date. Because reference group enrollees had not been identified as TGNC by the methods described above, they

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TABLE 1 Characteristics of the TGNC Children and Adolescents Enrolled in the STRONG

Child and Adolescent Characteristics	Transfeminine Cohort			Transmasculine Cohort		
	Transfeminine Cohort, *n* (%)	Reference Males, *n* (%)	Reference Females, *n* (%)	Transmasculine Cohort, *n* (%)	Reference Males, *n* (%)	Reference Females, *n* (%)
Age,[a] y						
3–9	161 (27)	1605 (28)	1598 (28)	90 (12)	892 (12)	888 (12)
10–17	427 (73)	4206 (72)	4204 (72)	655 (88)	6448 (88)	6459 (88)
Health plan site						
KPNC	344 (59)	3392 (58)	3378 (58)	431 (58)	4238 (58)	4245 (58)
KPSC	227 (39)	2249 (39)	2254 (39)	295 (40)	2915 (40)	2912 (40)
KPGA	17 (2.9)	170 (2.9)	170 (2.9)	19 (2.6)	187 (2.6)	190 (2.6)
Race and/or ethnicity						
Non-Hispanic white	268 (46)	2633 (45)	2629 (45)	374 (50)	3663 (50)	3671 (50)
Non-Hispanic African American	53 (9.0)	523 (9.0)	521 (9.0)	57 (7.7)	564 (7.7)	564 (7.7)
Asian American and/or Pacific Islander	37 (6.3)	367 (6.3)	370 (6.4)	60 (8.1)	596 (8.1)	594 (8.1)
Hispanic	179 (30)	1779 (31)	1772 (31)	204 (27)	2018 (27)	2020 (27)
Other and/or unknown	51 (8.7)	509 (8.8)	510 (8.8)	50 (6.7)	499 (6.8)	498 (6.8)
Use ever before index date (average visits per y)						
0	22 (3.7)	325 (5.6)	321 (5.5)	23 (3.1)	367 (5.0)	350 (4.8)
<1	15 (2.6)	568 (9.8)	530 (9.1)	25 (3.4)	763 (10)	746 (10)
1–3	127 (22)	1815 (31)	1879 (32)	154 (21)	2583 (35)	2562 (35)
>3–6	171 (29)	1712 (29)	1781 (31)	240 (32)	2200 (30)	2235 (30)
>6–9	115 (20)	757 (13)	763 (13)	107 (14)	795 (11)	777 (11)
>9	137 (23)	631 (11)	528 (9.1)	196 (26)	630 (8.6)	675 (9.2)
Unknown	1 (0.2)	3 (0.1)	0 (0.0)	0 (0.0)	2 (0.0)	2 (0.0)
Use 6 mo before index date (average visits per mo)						
0	101 (17)	2225 (38)	2062 (36)	111 (15)	2825 (39)	2502 (34)
<1	258 (44)	2846 (49)	2903 (50)	277 (37)	3531 (48)	3640 (50)
1–2	141 (24)	552 (9.5)	625 (11)	195 (26)	757 (10)	901 (12)
>2	87 (15)	186 (3.2)	212 (3.7)	162 (22)	225 (3.1)	302 (4.1)
Unknown	1 (0.2)	2 (0.0)	0 (0.0)	0 (0.0)	2 (0.0)	2 (0.0)
Total	588 (2.1)	5811 (21)	5802 (21)	745 (2.7)	7340 (27)	7347 (27)

KPGA, Kaiser Permanente Georgia; KPNC, Kaiser Permanente Northern California; KPSC, Kaiser Permanente Southern California.

[a] Assessed at index date (date of first evidence of transgender status in EMRs).

were assumed to be cisgender (ie, no evidence that gender identity does not correspond to assigned gender at birth). The race and/or ethnicity categories used were non-Hispanic white, non-Hispanic African American, Asian American and/or Pacific Islander, Hispanic, and other races. Index date was defined on the basis of the first recorded evidence of TGNC status. For some TGNC cohort members, <10 matched reference cisgender males or females were available; no TGNC individual was matched to <7 referents of either sex.

Subjects 3 through 17 years old at the index date were included in this study. Children <3 years old were excluded to reduce possible instability in gender identification and mental health diagnoses among the cohort.[8] The ICD-9 codes for mental health diagnoses were grouped into categories of conditions according to recommendations from the Mental Health Research Network[34]: anxiety disorders, attention deficit disorders, autism spectrum disorders, bipolar disorders, conduct and/or disruptive disorders, depressive disorders, eating disorders, other psychoses, personality disorders, schizophrenia spectrum disorders, self-inflicted injuries (including poisonings), substance use disorders, and suicidal ideation (Supplemental Table 7). People could be represented more than once if they had multiple diagnoses and were thus counted in each category for which they had a diagnosis.

The prevalence of mental health conditions in each of these categories was calculated for 2 time windows: any time (ever) and within 6 months before the index date. These 2 time windows were selected to examine mental health status just proximal to TGNC identification and to capture longer-standing conditions diagnosed at earlier ages (eg, autism spectrum disorders). In these calculations, the numerator for each disorder or group of disorders included persons with at least 1 relevant diagnostic code recorded during the time interval of interest. All prevalence estimates were calculated separately for transfeminine and transmasculine subjects within 2 age groups: 3 to 9 years (children) and 10 to 17 years (adolescents). Age categorization was selected to separately represent young school-aged children and adolescents by using the adolescent starting age of 10 years, corresponding to the World Health Organization's definition.[35] To assess differences in the severity of the conditions of interest, additional

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TABLE 2 Prevalence of Mental Health Diagnoses in TGNC Children Ages 3–9 Years Relative to Those in Referent Groups

Categories of Mental Health Disorders	Prevalence in Transfeminine Subjects, *N* (%)	PR (95% CI)[a] in Transfeminine Subjects		Prevalence in Transmasculine Subjects, *N* (%)	PR (95% CI)[a] in Transmasculine Subjects	
		Versus Reference Males	Versus Reference Females		Versus Reference Males	Versus Reference Females
All diagnoses of interest						
Ever before index date	51 (31.7)	3.0 (2.3–3.9)	5.7 (4.2–7.7)	31 (34.4)	3.3 (2.3–4.6)	5.4 (3.7–7.8)
6 mo before index date	46 (28.6)	6.0 (4.3–8.4)	13.0 (8.7–19.6)	26 (28.9)	5.9 (3.8–9.0)	10.7 (6.4–17.8)
Anxiety disorders						
Ever before index date	19 (11.8)	4.4 (2.6–7.4)	6.3 (3.6–10.9)	14 (15.6)	6.3 (3.3–11.9)	6.0 (3.2–11.3)
6 mo before index date	15 (9.3)	16.3 (6.7–41.4)	23.3 (8.8–68.5)	9 (10.0)	9.8 (3.4–27.6)	12.2 (4.0–37.3)
Attention deficit disorders						
Ever before index date	24 (14.9)	3.3 (2.1–5.0)	6.1 (3.8–9.9)	14 (15.6)	2.8 (1.6–4.9)	6.9 (3.6–13.2)
6 mo before index date	22 (13.7)	5.0 (3.1–8.1)	10.9 (6.1–19.6)	14 (15.6)	4.2 (2.3–7.6)	12.6 (5.9–26.8)
Autism spectrum disorders						
Ever before index date	8 (5.0)	2.2 (0.9–4.9)	11.8 (3.7–38.9)	0	NC	NC
6 mo before index date	8 (5.0)	3.9 (1.5–9.5)	20.8 (5.5–95.3)	0	NC	NC
Conduct and/or disruptive disorders						
Ever before index date	12 (7.5)	3.3 (1.5–6.7)	14.2 (5.4–38.8)	7 (7.8)	6.2 (2.0–17.5)	12.3 (3.5–45.5)
6 mo before index date	8 (5.0)	8.3 (2.8–23.8)	83.0 (11.0–3707.3)	[b]	13.7 (2.3–95.1)	20.5 (2.9–229.2)
Depressive disorders						
Ever before index date	9 (5.6)	6.7 (2.5–17.0)	7.8 (2.9–20.6)	10 (11.1)	27.5 (7.7–123.0)	12.3 (5.0–30.5)
6 mo before index date	6 (3.7)	8.8 (2.4–31.1)	12.3 (3.1–51.5)	8 (8.9)	43.0 (8.4–422.3)	28.5 (6.7–170.2)
Eating disorders						
Ever before index date	[b]	3.7 (0.8–12.6)	6.7 (1.4–28.8)	0	NC	NC
6 mo before index date	[b]	10.0 (0.1–787.4)	10.0 (0.1–784.0)	0	NC	NC

NC, not calculated because there were 0 cases among transgender subjects.

[a] Logistic regression with exact 95% CIs for rare events (prevalence ≤10% in both the transgender and referent cohorts) or logistic regression with log link and approximate 95% CIs for not-rare events (>10% prevalence in either the transgender or referent cohorts).

[b] Fewer than 5 cases were not reported.

analyses were conducted for admittance or most serious diagnoses associated with hospitalizations.

Each prevalence estimate in the TGNC cohort was compared with corresponding estimates among matched cisgender male and female referents. For ease in presenting results, cisgender males and females will be referred to as male or female referents. Referents were assigned the same index date as the matched TGNC cohort member. For rare events (prevalence ≤10% in both the TGNC and referent cohorts), the prevalence ratios (PRs) were approximated by calculating the odds ratios with exact 95% confidence intervals (CIs). For events with >10% prevalence in either group, PRs and CIs were calculated by using logistic regression with the log link option.

In addition to the primary analysis that captures the true prevalence of mental health conditions, we conducted sensitivity analyses to address possible differences in the prevalence of mental health conditions because of differences in health care visit frequency (use) between TGNC cohort members and those in the referent groups. We excluded the index date from the time window, and when the sample size was sufficient (>5 cases in each group), the PR estimates were adjusted for use of care. Average health care use was calculated for each individual by dividing the total number of visits by the cumulative duration of enrollment; this was expressed as the number of visits per year of enrollment in the analyses of "ever" prevalence and as the number of visits per month of enrollment in the analyses within 6 months before the index date. In adjusted analyses, average use was dichotomized for each time interval as above (high) or below (low) the median by using cutoffs for the overall population.

Analyses were conducted by using SAS version 9.4 (SAS Institute, Inc, Cary, NC) with custom macros developed at the Biostatistics and Bioinformatics Shared Resource at the Winship Cancer Institute of Emory University.[36]

RESULTS

A total of 2164 cohort candidates 3 to 17 years of age at the index date were initially identified in the EMR. After validation, 1347 (62%) were confirmed as TGNC. People excluded from the TGNC cohort were most often those with keywords referring to family or partners, standard disclaimers not related to care (eg, listing indications for hormone use), or evidence of disorders of sex development. After excluding subjects with unknown gender assigned at birth (*N* = 14), the final analysis data set was based on a cohort of 1333 subjects matched with

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TABLE 3 Prevalence of Mental Health Diagnoses in TGNC Adolescents Ages 10–17 Years Relative to Those in Referent Groups

Categories of Mental Health Disorders	Prevalence in Transfeminine Subjects, *N* (%)	PR (95% CI)[a] in Transfeminine Subjects		Prevalence in Transmasculine Subjects, *N* (%)	PR (95% CI)[a] in Transmasculine Subjects	
		Versus Reference Males	Versus Reference Females		Versus Reference Males	Versus Reference Females
All diagnoses of interest						
Ever before index date	303 (71.0)	3.0 (2.8–3.3)	3.6 (3.3–3.9)	488 (74.5)	3.0 (2.8–3.2)	3.7 (3.4–3.9)
6 mo before index date	253 (59.3)	7.8 (6.8–8.9)	8.6 (7.5–9.8)	429 (65.5)	7.8 (7.1–8.7)	8.7 (7.8–9.6)
Anxiety disorders						
Ever before index date	159 (37.2)	5.0 (4.2–5.8)	4.2 (3.6–4.9)	255 (38.9)	4.9 (4.3–5.6)	4.0 (3.5–4.5)
6 mo before index date	106 (24.8)	18.0 (13.3–24.4)	9.2 (7.2–11.8)	175 (26.7)	15.7 (12.5–19.6)	8.7 (7.2–10.5)
Attention deficit disorders						
Ever before index date	107 (25.1)	2.0 (1.7–2.4)	5.3 (4.3–6.5)	106 (16.2)	1.3 (1.0–1.5)	3.3 (2.7–4.1)
6 mo before index date	68 (15.9)	3.8 (2.9–4.9)	9.0 (6.6–12.4)	69 (10.5)	2.5 (1.9–3.3)	6.4 (4.6–8.8)
Autism spectrum disorders						
Ever before index date	31 (7.3)	4.1 (2.6–6.4)	25.2 (12.7–52.9)	24 (3.7)	1.8 (1.1–2.8)	7.6 (4.3–13.5)
6 mo before index date	25 (5.9)	8.1 (4.6–14.3)	260.8 (42.5–10 733.9)	17 (2.6)	3.4 (1.8–6.1)	17.2 (7.4–42.1)
Bipolar disorders						
Ever before index date	23 (5.4)	9.9 (5.3–18.5)	10.3 (5.5–19.5)	34 (5.2)	8.6 (5.2–13.9)	8.0 (4.9–12.9)
6 mo before index date	16 (3.8)	18.1 (7.5–46.9)	14.8 (6.4–35.6)	19 (2.9)	11.3 (5.5–23.3)	14.8 (6.9–32.8)
Conduct and/or disruptive disorders						
Ever before index date	60 (14.1)	2.8 (2.1–3.7)	6.6 (4.8–9.0)	59 (9.0)	1.7 (1.3–2.3)	4.5 (3.2–6.2)
6 mo before index date	22 (5.2)	5.3 (3.0–9.1)	12.6 (6.4–25.2)	27 (4.1)	5.5 (3.3–9.0)	10.6 (5.9–19.1)
Depressive disorders						
Ever before index date	207 (48.5)	5.8 (5.1–6.7)	4.4 (3.9–5.0)	403 (61.5)	7.0 (6.4–7.8)	5.7 (5.2–6.2)
6 mo before index date	172 (40.3)	23.5 (18.2–30.4)	10.1 (8.4–12.2)	326 (49.8)	22.8 (19.0–27.3)	13.3 (11.5–15.4)
Eating disorders						
Ever before index date	18 (4.2)	7.7 (3.9–14.9)	3.3 (1.8–5.7)	28 (4.3)	6.0 (3.6–9.8)	3.2 (2.0–5.0)
6 mo before index date	11 (2.6)	18.5 (6.2–61.2)	6.1 (2.6–13.8)	19 (2.9)	27.5 (11.0–77.6)	8.7 (4.4–17.0)
Psychoses						
Ever before index date	19 (4.5)	19.5 (8.6–47.3)	12.2 (5.9–25.5)	32 (4.9)	12.2 (7.0–21.3)	14.4 (8.1–25.9)
6 mo before index date	10 (2.3)	20.1 (6.2–75.4)	100.6 (14.2–4375.0)	18 (2.8)	22.7 (9.4–60.6)	30.4 (11.5–93.8)
Personality disorders						
Ever before index date	10 (2.3)	14.4 (4.9–44.7)	11.2 (4.1–31.2)	15 (2.3)	11.6 (5.1–26.6)	7.9 (3.7–16.6)
6 mo before index date	[b]	19.8 (2.8–220.0)	19.8 (2.8–219.9)	9 (1.4)	29.9 (7.4–172.1)	29.9 (7.4–172.4)
Schizophrenia spectrum disorders						
Ever before index date	5 (1.2)	49.7 (5.5–2357.0)	24.9 (4.1–261.7)	13 (2.0)	21.7 (7.7–69.9)	32.6 (10.0–137.8)
6 mo before index date	[b]	[c]	14.8 (1.7–178.2)	10 (1.5)	99.8 (14.2–4338.3)	50.0 (10.6–470.2)
Self-inflicted injuries						
Ever before index date	11 (2.6)	3.9 (1.8–8.2)	4.1 (1.8–8.6)	54 (8.2)	14.0 (9.1–21.8)	8.7 (5.9–12.8)
6 mo before index date	7 (1.6)	69.9 (9.0–3159.2)	17.5 (4.4–81.7)	28 (4.3)	143.7 (36.1–1247.8)	20.5 (10.4–42.4)
Substance use disorders						
Ever before index date	33 (7.7)	3.0 (1.9–4.5)	3.7 (2.4–5.6)	46 (7.0)	2.4 (1.7–3.4)	3.3 (2.3–4.7)
6 mo before index date	24 (5.6)	5.8 (3.3–9.8)	8.9 (4.9–16.0)	34 (5.2)	4.5 (2.9–6.9)	8.2 (5.0–13.2)
Suicidal ideation						
Ever before index date	32 (7.5)	17.8 (9.7–33.6)	11.3 (6.5–19.4)	68 (10.4)	21.2 (13.8–33.2)	11.0 (7.7–15.9)
6 mo before index date	21 (4.9)	54.2 (18.2–218.3)	31.0 (12.6–86.7)	47 (7.2)	45.2 (22.9–97.1)	24.9 (14.3–44.6)

[a] Logistic regression with exact 95% CIs for rare events (prevalence ≤10% in both the transgender and referent cohorts) or logistic regression with log link and approximate 95% CIs for not-rare events (>10% prevalence in either the transgender or referent cohorts).

[b] Fewer than 5 cases were not reported.

[c] Not calculated because there were 0 cases among referents.

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TABLE 4 Prevalence of Hospitalization for Mental Health Diagnoses in TGNC Children Ages 10–17 Years Relative to Those in Referent Groups

Categories of Mental Health Disorders	Prevalence in Transfeminine Subjects, *N* (%)	PR (95% CI)[a] in Transfeminine Subjects		Prevalence in Transmasculine Subjects, *N* (%)	PR (95% CI)[a] in Transmasculine Subjects	
		Versus Reference Males	Versus Reference Females		Versus Reference Males	Versus Reference Females
All diagnoses of interest						
Ever before index date	58 (13.6)	9.9 (6.9–14.0)	8.9 (6.3–12.5)	99 (15.1)	10.2 (7.8–13.3)	7.8 (6.1–10.0)
6 mo before index date	33 (7.7)	43.9 (19.7–110.7)	35.1 (16.7–80.4)	59 (9.0)	35.3 (20.4–64.1)	21.9 (13.7–35.8)
Anxiety disorders						
Ever before index date	9 (2.1)	9.0 (3.2–24.9)	6.0 (2.3–14.8)	25 (3.8)	15.0 (7.7–29.8)	13.4 (7.1–26.0)
6 mo before index date	6 (1.4)	59.8 (7.2–2757.2)	29.9 (5.3–303.7)	13 (2.0)	43.4 (11.9–238.3)	32.6 (10.0–137.8)
Attention deficit disorders						
Ever before index date	20 (4.7)	9.8 (5.0–19.1)	14.7 (7.0–31.7)	14 (2.1)	4.0 (2.0–7.7)	9.4 (4.2–20.9)
6 mo before index date	6 (1.4)	19.9 (4.2–123.6)	59.8 (7.2–2755.8)	[b]	[c]	9.9 (1.3–74.0)
Autism spectrum disorders						
Ever before index date	[b]	6.6 (1.4–28.0)	39.7 (3.9–1957.7)	5 (0.8)	5.0 (1.3–16.0)	8.3 (2.0–32.6)
6 mo before index date	[b]	[c]	[c]	[b]	3.3 (0.1–41.0)	[c]
Bipolar disorders						
Ever before index date	12 (2.8)	30.3 (9.1–129.6)	13.5 (5.2–36.4)	18 (2.8)	10.1 (4.9–20.7)	9.1 (4.5–18.2)
6 mo before index date	[b]	39.7 (3.9–1958.7)	19.8 (2.8–219.9)	8 (1.2)	15.9 (4.6–62.0)	19.9 (5.3–90.7)
Conduct and/or disruptive disorders						
Ever before index date	10 (2.3)	16.8 (5.5–56.4)	16.8 (5.5–56.4)	10 (1.5)	5.9 (2.4–13.6)	6.7 (2.7–15.9)
6 mo before index date	5 (1.2)	49.7 (5.5–2357.0)	[c]	[b]	39.6 (3.9–1951.1)	39.6 (3.9–1954.4)
Depressive disorders						
Ever before index date	41 (9.6)	21.1 (12.1–38.1)	10.3 (6.4–16.4)	83 (12.7)	17.8 (12.5–25.2)	9.1 (6.8–12.1)
6 mo before index date	26 (6.1)	68.0 (23.4–269.3)	54.3 (20.4–182.2)	49 (7.5)	104.0 (41.5–335.9)	21.7 (12.9–37.2)
Eating disorders						
Ever before index date	[b]	6.6 (0.5–57.7)	2.8 (0.3–14.9)	6 (0.9)	29.8 (5.3–302.1)	4.0 (1.3–10.9)
6 mo before index date	[b]	[c]	3.3 (0.1–41.0)	[b]	29.8 (5.3–302.1)	4.0 (1.3–10.9)
Psychoses						
Ever before index date	8 (1.9)	26.7 (6.4–156.9)	11.4 (3.6–37.2)	10 (1.5)	20.0 (6.2–74.7)	12.5 (4.4–36.6)
6 mo before index date	5 (1.2)	49.7 (5.5–2357.0)	49.7 (5.5–2355.8)	[b]	19.8 (2.8–219.1)	9.9 (1.8–53.3)
Personality disorders						
Ever before index date	[b]	39.7 (3.9–1958.7)	19.8 (2.8–219.9)	8 (1.2)	26.5 (6.3–155.7)	8.9 (3.0–26.0)
6 mo before index date	0 (0)	NC	NC	7 (1.1)	[c]	69.7 (8.9–3144.6)
Schizophrenia spectrum disorders						
Ever before index date	[b]	[c]	14.8 (1.7–178.2)	[b]	9.9 (1.8–53.2)	13.2 (2.2–90.4)
6 mo before index date	0 (0)	NC	NC	[b]	9.9 (0.1–773.9)	9.9 (0.1–775.2)
Self-inflicted injuries						
Ever before index date	[b]	6.6 (0.5–57.7)	4.9 (0.4–34.6)	13 (2.0)	65.2 (14.7–596.2)	13.0 (5.3–33.4)
6 mo before index date	[b]	[c]	[c]	7 (1.1)	[c]	34.8 (6.6–344.4)
Substance use disorders						
Ever before index date	8 (1.9)	5.7 (2.1–14.7)	4.2 (1.6–10.1)	16 (2.4)	6.2 (3.1–12.0)	6.2 (3.1–12.1)
6 mo before index date	6 (1.4)	29.9 (5.3–303.9)	12.0 (3.0–49.7)	9 (1.4)	11.2 (3.8–33.5)	11.2 (3.8–33.6)
Suicidal ideation						
Ever before index date	9 (2.1)	15.1 (4.8–51.7)	5.6 (2.2–13.6)	29 (4.4)	19.8 (10.2–40.1)	11.5 (6.5–20.4)
6 mo before index date	7 (1.6)	[c]	23.3 (5.3–140.2)	17 (2.6)	24.5 (9.6–70.1)	21.5 (8.7–57.7)

NC, not calculated because there were 0 cases among transgender subjects.

[a] Logistic regression with exact 95% CIs for rare events (prevalence ≤10% in both the transgender and referent cohorts) or logistic regression with log link and approximate 95% CIs for not-rare events (>10% prevalence in either the transgender or referent cohorts).

[b] Fewer than 5 cases were not reported.

[c] Not calculated because there were 0 cases among referents.

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13 151 reference males and 13 149 reference females.

The cohort included 588 (44%) transfeminine and 745 (56%) transmasculine children and adolescents (Table 1). Children <10 years old represented 27% of the transfeminine cohort and 12% of the transmasculine cohort. Compared with TGNC children (n = 251), in which 36% (n = 90) were transfeminine, 61% (n = 655) of adolescents (n = 1082) were transmasculine. More than 45% of subjects in both groups were white; Hispanics represented 30% of transfeminine and 27% of transmasculine subjects, whereas the remainder of the study population was approximately equally distributed among African Americans, Asian Americans and/or Pacific Islanders, and persons whose race and/or ethnicity was characterized as other or unknown. Health care use levels were much higher in both transfeminine and transmasculine subjects than in those in the corresponding reference groups.

The most common diagnostic categories among TGNC children 3 to 9 years of age were attention deficit disorders (15% transfeminine; 16% transmasculine) and anxiety disorders (12% transfeminine; 16% transmasculine; Table 2). The PR (95% CI) estimates for attention deficit disorders ranged from 2.8 (95% CI 1.6–4.9) to 13 (95% CI 5.9–27). The PR (95% CI) estimates for anxiety disorders ranged from 4.4 (95% CI 2.6–7.4) to 23 (95% CI 8.8–69) depending on the time window before the index date and the reference group. Among transfeminine children, 5% had an autism spectrum disorder diagnosis; however, no cases were observed in transmasculine children. For all the diagnostic categories, the most pronounced PR estimates were observed within the 6-month period before the index date. Among transfeminine children, the highest PR (95% CI) estimate was for conduct and/or disruptive disorders relative to reference females (83 [95% CI 11–3707]). Among transmasculine children, the highest PR (95% CI) estimate was for depressive disorders relative to reference males (43 [95% CI 8.4–422]). Additional analyses of the prevalence of hospitalizations by mental health diagnostic category were not possible in this age group because of small sample sizes.

In the adolescent group (age 10–17 years), like in the younger age group, attention deficit disorders and anxiety disorders remained common ("ever" prevalence: 25% transfeminine and 16% transmasculine; 40% both transfeminine and transmasculine, respectively; Table 3). The diagnostic category with the highest prevalence in this age group was depressive disorders, which were found in 49% of transfeminine and 62% of transmasculine subjects. For all diagnostic categories, PR estimates used to compare STRONG adolescents to matched reference groups were highest within 6 months before the index date. Compared with reference females, transfeminine and transmasculine adolescents experienced particularly pronounced increased prevalence in psychoses (PR 101 and 95% CI 14–4375; PR 30 and 95% CI 12–94, respectively). Additionally, the PR estimates among transfeminine subjects were particularly elevated for autism spectrum disorders (PR 261; 95% CI 43–10 734) and among transmasculine subjects for schizophrenia spectrum disorders (PR 50; 95% CI 11–470) compared with reference females. Compared with reference males, PR estimates for suicidal ideation and self-inflicted injuries for transfeminine subjects were 54 (95% CI 18–218) and 70 (95% CI 9.0–159), respectively, which were also high among transmasculine subjects, (45 [95% CI 23–97] and 144 [95% CI 14–4338], respectively).

When prevalence estimates were limited to mental health conditions recorded during hospitalizations, the patterns among adolescents generally remained the same. In several instances, however, the PR estimates could not be calculated because of the absence of cases in the reference groups (Table 4).

The median cutoff values used for adjusted analyses were 3.2 average visits per year for the "ever" analyses and 0.2 average visits per month for the 6-month analyses. The prevalence estimates were slightly attenuated or remained approximately the same for most diagnostic categories. However, some estimates changed appreciably. For children 3 to 9 years, adjusting for use 6 months before and excluding the index date produced the largest decrease in the PR (95% CI) for anxiety disorders, from 23 (95% CI 8.8–69) to 9.0 (95% CI 2.9–29) when transfeminine children were compared with reference males (Supplemental Table 8). The PR (95% CI) for suicidal ideation among transfeminine adolescents compared with reference males within 6 months of the index date decreased from 54 (95% CI 18–218) to 38 (95% CI 12–159; Supplemental Table 9).

DISCUSSION

The results of this study reveal that among TGNC youth, mental health conditions, specifically anxiety and depression, are common and often severe among adolescents, as evidenced by diagnoses associated with hospitalizations. Gender nonconforming children (3–9 years of age) have a higher prevalence of anxiety and attention deficit disorders compared with their cisgender counterparts. In nearly all

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instances, mental health diagnoses were more common in the TGNC youth than in referent children and adolescents.

These results support findings from previous research in which the sample sizes were much smaller.[17,19–22,37–42] Researchers in a survey of 101 transfeminine and transmasculine patients ages 12 to 24 years in a transgender youth clinic in Los Angeles found that 35% had symptoms of depression and >50% had suicidal thoughts.[19] In comparison, we found that adolescents had a higher prevalence (40%–60%) of depression but a lower prevalence of suicidal ideation (5%–10%). In a medical record abstraction study of 97 transfeminine and transmasculine patients ages 4 to 20 years presenting to the Gender Management Service Clinic at Boston Children's Hospital, 44% presented with a significant psychiatric history, 21% had a history of self-mutilation, and 9% had documentation of suicide attempts.[22] In a UK study, a baseline chart review of children 5 to 11 years old referred to a national specialty clinic revealed that 17% had symptoms of anxiety, and 15% had a history of suicidal ideation, self-harm, and/or a diagnosis of attention-deficit/hyperactivity disorder recorded before entering services.[39] Our results for children were similar for demonstrated anxiety (9%–16%) and attention deficit disorders (14%–16%). Direct comparisons to the current study are challenging because there are methodological differences. Two important differences are the way in which mental health conditions were ascertained and presentations of age. In addition, we included a broader population of children and adolescents who were not necessarily seeking treatment for gender-related issues.

In recent years, researchers in several studies have suggested that gender dysphoria may be associated with autism spectrum disorders.[43–45] The most widely cited evidence supporting this hypothesis comes from a study of 204 children and/or adolescents referred to the Gender Identity Clinic in Amsterdam.[46] The presence of an autism spectrum disorder was established via a standardized diagnostic interview,[47] yielding a prevalence of 10% among transfeminine patients and 4% among transmasculine patients, which was reported by the authors to be higher than the 1% estimate reported in the general population. The prevalence of autism spectrum disorders in our study was somewhat lower (7% in transfeminine and 3% in transmasculine subjects across both age groups), but our case ascertainment was based on documented diagnostic codes, and the denominator in our calculations was not limited to children with established gender dysphoria. With these differences in mind, our results are generally comparable to those reported in the Dutch study.

The gender ratio in this TGNC cohort reveals that transfeminine youth may present earlier in age than transmasculine individuals, which may pose a unique challenge to the early identification of mental health needs in transmasculine children and adolescents. Historically, researchers in studies of TGNC adolescents have reported a greater proportion of transfeminine than transmasculine subjects, but in recent years, the direction of the transmasculine: transfeminine ratio appears to have changed.[48] For example, researchers in 1 recent study observed that transmasculine youth with gender dysphoria (aged 12–24 years) presented in significantly higher numbers than their transfeminine counterparts.[19] Our data, which were based on EMRs, were used to confirm this observation. Therefore, providers should also be aware of the growing transmasculine population needing timely and appropriate medical and psychosocial services.

An important contribution of the STRONG to the extant literature is its relatively large cohort, which allowed for focusing on previously understudied groups (such as young children), and an evaluation of relatively rare events (such as hospitalizations). In addition, the current study was based on children and adolescents who were not necessarily in specialized care and enrolled in a large health care system; and we did not require participant opt-in. The availability of a well-defined source population allowed for matching transfeminine and transmasculine study subjects to male and female referents of the same age, race and/or ethnicity, and geographic region. This design feature permitted direct comparisons of prevalence estimates among transfeminine, transmasculine, and cisgender referent groups.

A limitation of this study is its cross-sectional design. Although we were able to retrospectively ascertain mental health conditions before the index date and we matched on the basis of membership year, a differential ascertainment of diagnoses could have occurred. The identification of the TGNC cohort was based on health care use, which is different from the matched referent groups. Results from sensitivity analyses adjusting for use and excluding the index date revealed a similar or slight attenuation of the PR results for most diagnostic categories. However, when adjusting for use 6 months before the index date, a more notable attenuation of PRs was seen in anxiety disorders in transfeminine children and suicidal ideation in transfeminine adolescents compared with reference males, indicating possible higher surveillance of mental health conditions in the several months

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before cohort identification. Nevertheless, this baseline study reveals that TGNC youth experience a multitude of mental health problems before initial presentation. However, there is indication that TGNC children who receive meaningful gender identity support do not necessarily experience elevated rates of depression and anxiety.[49] As the STRONG cohort follow-up extends, it will be possible to examine temporal changes in the frequency and severity of mental health problems, particularly in relation to the age of gender affirmation, which is an area of considerable uncertainty, and the impact of interventions to treat gender dypshoria.[50–53]

CONCLUSIONS

The most important finding is the high frequency of mental health conditions that TGNC children and adolescents experience. Especially worrisome are the results for suicidal ideation and self-inflicted injuries with prevalence estimates orders of a magnitude that is higher in TGNC children and adolescents than in matched cisgender reference groups. For nearly all mental health disorders, the PRs increased during the time window closest to the index date. Overall, these data reveal that children and adolescents presenting as TGNC to health care providers may require not only thorough and immediate evaluation of mental health needs but also urgent implementation of social and educational measures of gender identity support.

ABBREVIATIONS

CI: confidence interval
EMR: electronic medical record
ICD-9: *International Classification of Diseases, Ninth Edition*
KP: Kaiser Permanente
PR: prevalence ratio
STRONG: Study of Transition, Outcomes, and Gender
TGNC: transgender and/or gender nonconforming

within their areas of expertise (such as epidemiologic methods, bias, health care access and health service use interpretation, and the broad messaging of the manuscript), and revised the manuscript; Drs Liu, Flanders, and Nash provided substantial statistical analysis consultation, conducted the analyses, and critically reviewed and revised the manuscript for important statistical interpretation of the data; Ms Cromwell substantially contributed to the design of multisite data collection, critically reviewed the manuscript for appropriate interpretation of the data variables with respect to the results, and revised the manuscript; Ms Millman and Ms Robinson conceptualized the study and substantially contributed to the acquisition of data by coordinating site data collection, critically reviewed and revised the manuscript by providing and ensuring the interpretation of results with respect to site-specific patient populations, and revised the manuscript; Drs Giammattei, Sandberg, and Tangpricha provided clinical consultation regarding the interpretation of results, revised the manuscript, and critically reviewed the manuscript for important intellectual content specific to transgender and/or gender nonconforming youth, gender transitioning, and the mental health outcomes discussed in the manuscript; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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Mental Health of Transgender and Gender Nonconforming Youth Compared With Their Peers

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